

Lesson 4



U.S.-Mexico border at Rio Grande River in Texas

From a Different Perspective

In this lesson, students take on the roles of members of various U.S. and Mexican stakeholder groups (governmental, non-governmental, indigenous, and so on) active in and around the Rio Grande River.

Each student receives information about the assigned group; they use that information to learn about the group's perspective on how best to manage the resources of the Rio Grande. During one class period, students read this background information about their groups and prepare presentations for a simulated

“Conference on Environmental Partnerships between the United States and Mexico.” All members of the group have a specific role to fulfill in the simulated conference, which takes place in the next class period, during which students present their groups' perspectives and learn about the perspectives of

other stakeholders.

A discussion following the conference engages students in analyzing how the various stakeholders in the two nations assess environmental issues and balance them with the social, economic, and political needs of their country.

Learning Objective

Describe the difference between the two countries in terms of how each assesses and balances social, economic, political, and environmental factors in its decisions about the use and management of natural systems and the goods and ecosystem services they produce.



infrastructure related to irrigation and municipal water distribution systems throughout the river basin. CAN estimates the total cost of these improvements to be \$40 million just in the area surrounding the Rio Grande. The BECC is also trying to work with the indigenous groups along the border to encourage involvement in the process. The goal is to get as many stakeholders as possible involved in the research, planning, and policy development process.

Background

The water from the Rio Grande (or Rio Bravo as it is called in Mexico) accounts for most of the drinking water for populations on both sides of the border. The economic growth in this area over the last 20 years has decreased the poverty in the region; however, the rate of poverty in this part of the border region is still much higher than the rest of the United States and Mexico.

The economic growth has also directly and indirectly influenced the water quality in the river. An increase in industrialization and

population has led to greater risk of contamination of the water. The act of treating the water, tracking hazardous waste, and enforcing environmental laws, has been a difficult task for the local, state, and federal governments of both nations. In some areas of the Rio Grande, people are urged to avoid any contact with the water, to avoid getting sick.

In addition to affecting the quality of drinking water, population growth has affected the habitats of many aquatic and terrestrial species. In many cases, the growth has resulted in consumption of wildlife habitats for building sites.

Many stakeholders are involved in trying to address the water quality issue along the Rio Grande: the Texas Water Department Board, the Office of Rural Community Affairs, the Border Environment Cooperative Commission (BECC), residents, workers and owners of the maquiladoras, farmers, indigenous groups, and local government officials. Many have started to work together to decrease water pollution and increase the water supply.

One constraint is that monies are needed to reach these goals. Just recently, the Commission de Agua Nacional (CAN), Mexico's National Water Commission, asked the North American Development Bank (NADB) for funds to help bolster the

Key Vocabulary

Allocation: Something, such as shared funds, that is distributed to individuals or groups according to a plan and specific purpose.

U.S. Environmental Protection Agency:

The U.S. government agency that implements federal laws designed to promote public health by protecting air, water, and soil from pollution.

Indigenous (or native):

Originating in a particular region or country.

Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAT):

The Mexican government agency that encourages the protection, restoration, and preservation of ecosystems, natural resources, and environmental goods and services.

Stakeholders: Individuals, groups, or organizations that have a vested interest in a particular action or decision.



Water tank at a Mexican home

Toolbox



Summary of Activities

Students read about the Rio Grande and work in groups to prepare for a simulated conference. They present the perspectives of various stakeholders concerned about water quality issues in the Rio Grande watershed and discuss the factors important to these stakeholders.



Instructional Support

See Extensions & Unit Resources, page 32

Prerequisite Knowledge



Students should be able to:

- write and present a brief speech on a selected topic.

Advanced Preparation



Gather and prepare Activity Masters:

- Prepare the **The Stakeholders** cards so there are enough for 8 groups

Gather and prepare Materials Needed.

Gather and prepare Visual Aids:

- Prepare transparencies.
- Gather from previous lessons:
 - **Border Region Map** transparency from Lesson 1.

Create Stakeholder Groups:

- Divide the class into eight groups and assign students to one of the stakeholder groups.

Set up Conference Area (Prior to Session 2):

- Arrange the classroom furniture to create a “conference” area.



Materials Needed



A-V equipment:

- Overhead or LCD projector, screen

Activity Supplies:

- Transparency markers: variety of colors for eight groups (Optional)
- Timer (for presentations)

Class supplies:

- Markers, paper, pencils, tape

Visual Aids



Transparencies:

- **Who Are the Stakeholders?**,
Visual Aid #4
- **Conference Roles**,
Visual Aids #5-6
- **Agenda for the Conference**,
Visual Aid #7

Duration



Preparation Time

20 min.

Instructional Time

55-min. each,
Session 1 and Session 2



Safety Notes

None

Activity Masters in the Supporting Materials (SM)

Background on the Rio Grande

SM, Pages 28–29
One per student

The Stakeholders

SM, Pages 30–33
One per student,
equally divided
among eight groups

Environmental Conference Questionnaire

SM, Page 34
One per student

Conference Notes

SM, Pages 35–36
One per student

Procedures

Vocabulary Development

As appropriate, in each lesson introduce new vocabulary words using the **Key Unit Vocabulary** (Lesson 1 Activity Master).

Session 1—Step 1

Display the transparency of the **Border Region Map** (Visual Aid #1). Ask students to look at the map and find the river that creates a natural boundary between the two nations. (*The Rio Grande*)

Tell students that the Rio Grande begins in the Rocky Mountains (Colorado) and flows south 1,885 miles (3034 km) through New Mexico and Texas before it ends in the Gulf of Mexico. For about 600 miles (966 km), the river serves as the border between the United States and Mexico. The river travels through mountains and forests, deserts, and wetlands. The river is an important resource for the people of the area as well as the diverse plant life and wildlife in the watershed.

Step 2

Distribute copies **Background on the Rio Grande** (Lesson 4 Activity Master) to each student. Read the article as a class and discuss any unfamiliar vocabulary. When the class has completed the reading, ask the following questions:

- What are the water quantity problems involving the Rio Grande? (*A severe drought in the region has affected Mexico's ability to give the United States all of the water called for by a 1944 treaty. As population grows, so does the water use, which causes problems. Another issue is the invasive species that consume large amounts of water, leaving less for the people and natural systems in the region.*)
- What are the water quality problems involving the Rio Grande? (*The rapid population growth and lack of infrastructure to treat the water are resulting in reduced water quality. Some people do not have access to clean water, and people may become sick from the water.*)

Step 3

Display **Who Are the Stakeholders?** (Visual Aid #4) to introduce the stakeholders connected to problems and issues concerning the Rio Grande. Explain that students are going to work in groups; each group will try to understand the perspectives of one stakeholder group so that they can represent that stakeholder at a conference. In their group, each student will have a particular job to do. Although they have been pre-assigned to a stakeholder group, once in their groups students can choose the job for which they are best prepared, or would like to do for the conference.

Step 4

Place **Conference Roles** (Visual Aid #5 & 6) on the overhead, and read over the various jobs that must be done in each group. Point out that students will most likely be in groups of four or five (depending on class size). If there are only four students in a group, you can eliminate the role of “Designer of Handout,” or one of the students can take on two roles.

Explain that students will aid their stakeholder group in preparing for a simulated “Conference on Environmental Partnerships,” which will be held during the next class period.

Put **Who Are the Stakeholders?** back on the overhead or LCD projector and have students get into their pre-assigned groups in various locations around the room, taking their copies of **Background on the Rio Grande** with them.

Step 5

Distribute copies to each stakeholder group of their section of **The Stakeholders** (Lesson 4 Activity Master) and a copy of **Environmental Conference Questionnaire** (Lesson 4 Activity Master). Instruct the groups to read and discuss the background information about their stakeholder group using **Environmental Conference Questionnaire** to guide their discussion. They should also choose the job each group member will take to prepare for and present at the conference and note that information on **Environmental Conference Questionnaire**.



Step 6

Instruct the groups to spend the rest of the class period preparing for the conference by completing their research, writing their speech, and creating their map or other visual aid for use at the conference.

Display the transparencies of the **Border Region Map** and the **Conference Roles** on the overhead or LCD projector while the groups are working.

Step 7

When the class period ends, have students take **Environmental Conference Questionnaire**, the reading about their stakeholder's perspective, and the **Background on the Rio Grande** home to help them continue to prepare for the conference. Collect **Environmental Conference Questionnaire** and the readings at the beginning of the next session and use in assessment.

Session 2—Step 1

Have students sit with their stakeholder groups in the conference area. Collect **Environmental Conference Questionnaire** from each student, along with the background readings from Lesson 4.

Step 2

Display the **Agenda for the Conference** (Visual Aid #7) on the overhead projector and distribute the **Conference Notes** (Lesson 4 Activity Master). Welcome all the groups to the conference by reading aloud the opening remarks. Point out that each group will have five minutes to present their perspective on the Rio Grande issues. Explain that while each group is presenting, the other participants at the conference should be listening and filling out the chart on the **Conference Notes** (Lesson 4 Activity Master). Suggest to students that they just make brief notes, as there is limited writing space.

Step 3

Begin the presentation with the first group on the agenda. Keep time for each group. After each group has presented, conclude the conference by asking the participants the following questions:

- Why are the environmental issues surrounding the Rio Grande so complicated? (*The environmental issues have many different causes. The growth of the economy is encouraging immigration to the area. This growth puts stress on water resources. Also, the people in the area are generally very poor, making it difficult to improve the infrastructure and availability of clean water.*)
- When stakeholders try to make decisions about the management of resources, why is it complicated? (*People have many different views on what is important. Some groups need or want the economy to flourish, yet this can influence water quality and quantity. Other groups would like to be more protective of the water and other natural resources, yet many economies are built upon the resource. If the water becomes too limited, then the economy might suffer. Another important reason is that the Rio Grande is a transboundary watershed that influences the political relationship between the United States and Mexico.*)
- How can stakeholders balance everyone's social, economic, and political concerns when dealing with environmental issues? (*All people involved in the process need to understand the various positions. They need to acknowledge and accept other viewpoints and be willing to work with each other to come to some sort of agreement.*)

Step 5

Give each group time to finish their **Conference Notes**.

Collect the speeches, maps, and other materials from each group, along with the **Conference Notes** from each student for use in assessment.

Lesson Assessment

Description

This lesson asks students to describe different ways groups in each country assess and balance social, economic, political, and environmental factors in their decisions about the use and management of natural systems. Students complete a question on **Environmental Conference Questionnaire** (Lesson 4 Activity Master) that describes the viewpoint of a particular stakeholder; they record information about other stakeholder perspectives on their copy of the **Conference Notes** (Lesson 4 Activity Master).

Suggested Scoring

Use the Answer Key and Sample Answers on pages 81–84 to assess students' work on **Environmental Conference Questionnaire** and the **Conference Notes**.

The rubric below can be used to assess and score the groups' work.

Group Presentation Rubric

Conference Material	Excellent 4 points	Good 3 points	Needs Improvement 2 points	Incomplete 1 point
Speech	Well written and presented details clearly. It adhered to the time limit.	Well written and presented. It was too short/too long.	Lacked depth of content and/or was difficult to follow. Did not adhere to time limit.	Included limited information. Speaker was unprepared.
Handout (Optional)	Contains information on all of the four requirements, clearly presented.	Contains information on three of the four requirements, clearly presented.	Contains information on two of the four requirements and/or the information is not clearly presented.	Contains information on one of the 4 requirements and/or the information is not clearly presented.
Map	Neatly and accurately shows the region and how the group is connected to the river.	Shows the region and how the group is connected to the river.	Is hard to read and does not show how the group is connected to the river.	Is hard to read and/or inaccurate.
Total Points:				

Answer Key and Sample Answers

Environmental Conference Questionnaire

Lesson 4 Activity Master

Name: _____

Instructions: After reading about and discussing your stakeholder group, answer the following questions:

1. Who is your group representing?

Answers depend on the stakeholder group assigned

2. How is this stakeholder or group of stakeholders connected to the Rio Grande?

Example: Kikapu (indigenous people) use the water in the river for irrigation of our farmland and the groundwater for domestic use. They have never really had access to water rights on the Rio Grande and feel left out of the process.

3. What is your role in the group?

Refer to next page for multiple possible answers for this question

4. What do you need to do to prepare for the conference?

Answers will depend on the role chosen and what still needs to be accomplished. Some examples would be write a speech, finish the map, create the handout, and so on.

Alternative Answers for Environmental Conference Questionnaire on previous page
Answer Key and Sample Answers

Kikapu (indigenous people): They use the water in the river for irrigation of their farmland and the groundwater for domestic use. They have never really had access to water rights on the Rio Grande and feel left out of the process.

Farmer in Northern Mexico: They use water from the Rio Grande to grow sugar cane. Their fathers and grandfathers grew cotton, and this generation tried to do the same. But the amount of water available to us is diminishing. They are struggling to keep the sugar cane crops alive during droughts, which are influencing their livelihoods.

U.S. Fish and Wildlife Service: Their job is to manage and preserve the aquatic ecosystem of the Rio Grande. The water quality and quantity are decreasing due to human activity. This is having a major effect on the endangered species of the area, as is the introduction of non-native species.

Santa Fe Environmental Group: They are very concerned about the Rio Grande Silvery Minnow, which is endangered due to lack of water in the Rio Grande. They believe people must try to change policy so that the environment is not destroyed.

City Planner in Brownsville, Texas: They see the river as a resource and need it for drinking water; however, they also would like to use the area where the river flows for development. Their population is rapidly growing, and needs more space. The Rio Grande is polluted and the water quantity is diminished. Either the ecosystem associated with the river needs to be restored, or the area needs to be used for houses.

Resident of Ciudad Juarez, Mexico: They are urban dwellers who depend on the river and the aquifers for drinking water. They now have to walk further to get water from the wells as some have been closed due to contamination. The lack of water treatment plants is causing this contamination.

Maquiladora Owners: They are connected to the Rio Grande because some other owners do not abide by the environmental laws and dispose of byproducts in the river, causing contamination. They believe the Mexican government must do more to enforce environmental laws so that people do not blame owners, like themselves, for the contaminated water.

The Border Environmental Cooperation Commission: They are concerned about the quality of the Rio Grande. Their main focus is the lack of infrastructure in Nuevo Laredo to deal with rain storms. Lack of infrastructure is causing sewage to contaminate the water. They are looking for financial help to try and rebuild the infrastructure in this area.

Conference Notes

Lesson 4 Activity Master | page 1 of 2

Name: _____

Complete the following table while you are listening to the presentations. Fill in the column for your own group as well.

Stakeholders	Where is the group located in relation to the Rio Grande?	How does the river affect the group? How does the group affect the river?	What factors influence the group's decisions about the river?	What are the group's goals for the river?
Border Environmental Cooperation Commission	<i>The group's headquarters is in Ciudad Juarez and El Paso. Both cities are located on the river.</i>	<i>The group affects the river by trying to protect the water and ecosystems surrounding the water. They are not directly impacted by the river.</i>	<i>The BECC is most concerned for the health of the environment and human population. All of the political, social, and economic factors must be considered when trying to improve the natural system.</i>	<i>One of the main goals is to improve the storm drain infrastructure in Nuevo Laredo. To do this, they must generate support from citizens and governmental officials and raise money.</i>
Santa Fe Environmental Group	<i>Santa Fe is located in New Mexico, which the Middle Rio Grande runs through. The Middle Rio Grande is a tributary of the Rio Grande River.</i>	<i>This group affects the river by advocating for the restoration of the natural ecosystem.</i>	<i>The main factor that influences their decision is to protect the environment. The social, political, and economic influences are not as important as preserving the environment.</i>	<i>The main goal is to save the Rio Grande silvery minnow, which is endangered. The group sued the federal government to try to get more water flowing through the river to promote a healthier habitat for the minnow.</i>
U.S. Fish and Wildlife Service	<i>The agency's regional headquarters is in Ciudad Juarez and El Paso. Both cities are located on the river.</i>	<i>The group affects the river by trying to protect the water and ecosystems surrounding the water. They are not directly impacted by the river.</i>	<i>The BECC is most concerned for the health of the environment and human population. All of the political, social, and economic factors must be considered when trying to improve the natural system.</i>	<i>One of the main goals is to improve the storm drain infrastructure in Nuevo Laredo. To do this, they must generate support from citizens and governmental officials and raise money.</i>
Residents of Ciudad Juarez, Mexico	<i>Santa Fe is located in New Mexico, which the Middle Rio Grande runs through. The Middle Rio Grande is a tributary of the Rio Grande River.</i>	<i>This group affects the river by advocating for the restoration of the natural ecosystem.</i>	<i>The main factor that influences their decision is to protect the environment. The social, political, and economic influences are not as important as preserving the environment.</i>	<i>The main goal is to save the Rio Grande silvery minnow, which is endangered. The group sued the federal government to try to get more water flowing through the river to promote a healthier habitat for the minnow.</i>

Conference Notes

Lesson 4 Activity Master | page 2 of 2

Name: _____

Complete the following table while you are listening to the presentations. Fill in the column for your own group as well.

Stakeholders	Where is the group located in relation to the Rio Grande?	How does the river affect the group? How does the group affect the river?	What factors influence the group's decisions about the river?	What are the group's goals for the river?
City Planner in Brownsville, Texas	<i>The city of Brownsville is located near the Rio Grande. It is built on the resacas of the river.</i>	<i>The city planners have to make sure there is enough housing and development for the people. This means using the land in the river ecosystem.</i>	<i>The financial costs of preserving the ecosystem, rather than the environmental costs, are more than what the city would make if the resacas were drained and houses were built there.</i>	<i>To make sure that the river and its resources are put to the best use in terms of benefiting the people of the city.</i>
Maquiladora Owners	<i>This group is located on the Mexican side of the border, not necessarily right on the Rio Grande.</i>	<i>This group uses the water for industrial purposes, and some owners dump by-products of their factories directly into the river.</i>	<i>The most important influence for this group is economic. They are concerned about the costs of cleaning their by-products. At the same time, they are also contributing a lot to the local economy.</i>	<i>This group would like the Mexican government to be more responsible and enforce the environmental laws so that the public does not view all maquiladora owners as polluters.</i>
Farmers in Northern Mexico	<i>The city of Brownsville is located near the Rio Grande. It is built on the resacas of the river.</i>	<i>The city planners have to make sure there is enough housing and development for the people. This means using the land in the river ecosystem.</i>	<i>The financial costs of preserving the ecosystem, rather than the environmental costs, are more than what the city would make if the resacas were drained and houses were built there.</i>	<i>To make sure that the river and its resources are put to the best use in terms of benefiting the people of the city.</i>
The Kikapu	<i>This group is located on the Mexican side of the border, not necessarily right on the Rio Grande.</i>	<i>This group uses the water for industrial purposes, and some owners dump by-products of their factories directly into the river.</i>	<i>The most important influence for this group is economic. They are concerned about the costs of cleaning their by-products. At the same time, they are also contributing a lot to the local economy.</i>	<i>This group would like the Mexican government to be more responsible and enforce the environmental laws so that the public does not view all maquiladora owners as polluters.</i>

Background on the Rio Grande

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*U.S.-Mexico border at Rio Grande River in Texas*

Background on the Rio Grande or Rio Bravo

The Rio Grande or Rio Bravo (its name in Mexico) begins in the Rocky Mountains in Colorado. It runs south through New Mexico. Eventually, the river becomes part of the international border between the United States and Mexico. Two major concerns involving the Rio Grande are water allocation and water quality.

This river is the center of an international controversy pitting the United States against Mexico. Several factors have created a water shortage problem in some parts of the Rio Grande. This area has endured an ongoing drought since the 1990s. The drought has resulted in groundwater depletion. It has also limited the amount of water Mexico can give Texas. An international treaty in 1944 called for Mexico to “allocate” or give Texas a certain

amount of Rio Grande water. Mexico currently owes the United States 1.4 million acre-feet of water under the provisions of the treaty. Due to the severity of the drought, however, Mexico has been unable to fulfill the agreement. The water availability becomes an increasing concern as the population in the region grows. Related concerns are growth of invasive aquatic weed species and river flow. Invasive species such as the water hyacinth consume large amounts of

Background on the Rio Grande

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water. Growing demand, drought, and invasive aquatic weeds have reduced the flow in the Lower Rio Grande. As a result, sandbars have formed and now prevent water from flowing to the Gulf of Mexico. The effects downstream are very detrimental, influencing the Lower Rio Grande agricultural region, the natural systems, and the communities downstream. Experts estimate the economic impacts at \$400 million annually.

One major issue with the Rio Grande is water quality. The population of the region along the river is growing rapidly. The wastewater infrastructure is not adequate to keep up with the population growth. Thus, people in the region have little access to safe water. Raw sewage increases levels of bacteria. The increased bacteria levels in turn increase the risk of humans contracting



Water tank at a Mexican home



Tractor spraying chemicals on field

diseases like hepatitis A. Agricultural runoff increases levels of nutrients in the water and decreases oxygen levels. These changes influence the natural river systems. Water quality issues are especially problematic for the poorer communities in the area, including indigenous groups, farmers, and *colonia* residents. Many have little access to potable water or adequate sewage treatment facilities.

The environmental issues surrounding the Rio Grande are binational. As a result, two nation's federal agencies are working together to assess and address water quality and water allocation issues that influence the region around the Rio Grande. The U.S. Environmental Protection Agency (U.S. EPA) is one of those agencies. The *Secretaria de Medio Ambiente y Recursos Naturales* (SEMARNAT) is the other. The two agencies have created a binational program to improve the natural and human systems in the region.

The Stakeholders

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Border Environmental Cooperation Commission-(BECC) (Group 1)

As part of the North American Free Trade Agreement, Mexico and the United States created the BECC in 1993. Its purpose is to “help preserve, protect and enhance the environment of the border region in order to advance the well-being of the people of the U.S. and Mexico.” To do this, the BECC assists states and local agencies in developing projects to increase infrastructure in the border region, analyze environmental projects, and evaluate the social and economic benefits of the projects. It is a binational group with headquarters in Ciudad Juarez and El Paso. The BECC has been responsible for numerous infrastructure projects—from wastewater treatment plants to sewage upgrades.

As a member of the BECC, you are very

concerned about the storm sewer network in the city of Nuevo Laredo, Tamaulipas. The current system contains pipes that have deteriorated. Serious flooding occurs during rain storms. When the roads flood, the storm water runs into the sanitary sewer. Untreated sewage then flows into the Rio Grande. As a result, the people of Nuevo Laredo face increased risk of contracting water-borne diseases. The sewage continues downstream, affecting hundreds of thousands of other people and ecosystems. Your hope is to not only attain the money needed for this project, but to generate support from local people, organizations, and federal agencies. The project will require generous financial support as well as patience in completing the project.

**Santa Fe Environmental Group (Group 2)**

You are members of a Santa Fe environmental group that has filed a lawsuit against the U.S. government. Your group blames the government for the plight of the Rio Grande silvery minnow. The Endangered Species Act protects that fish, one of five native species of fish left in the Rio Grande. Yet it is in danger of becoming extinct—and you believe it is the government’s fault.

The Rio Grande silvery minnow was once one of the most abundant species of fish in the Rio Grande watershed. Due to drought, dam construction, water extraction, and poor water quality, the minnow has disappeared from 95% of its habitat. Most of the water in the Rio Grande is allocated to municipal, industrial, and federal use. There just isn’t enough water in the Rio Grande to support the silvery minnow. A

Conservation Water Agreement between New Mexico and the federal government provided for 100,000 acre-feet of water to be set aside for endangered species. However, because of the severe drought over the past 10 years, the federal government had to use water that was supposed to be set aside for endangered species. The silvery minnow population has continued to decline.

Many environmentalists think of the silvery minnow as “the canary in a coal mine” for the Rio Grande. The health of the silvery minnow foretells the health of the river. Your group believes that the death of the silvery minnow in the wild means the death of the larger Rio Grande ecosystem.

The Stakeholders

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U.S. Fish and Wildlife Service (Group 3)

You work for the Fish and Wildlife Service, an agency of the U.S. government. You are concerned about freshwater ecosystems in Texas. These ecosystems contribute to the natural and human systems. Freshwater in Texas is an economic source for tourism, agriculture, and urban development. It also is home to many endangered aquatic species. Of the more than 170 freshwater fish species found in Texas, more than 20 are threatened or endangered. Environmental changes like dam construction, irrigation, salinization, non-native species, and pollution all influence the fish and wildlife that inhabit the streams.

These environmental changes influence the natural systems and the freshwater aquatic

species, in some cases changing the entire ecosystem. Monitoring the ecosystems and evaluating the human effect on the streams is important to you, as is understanding the relationships between human activities and natural systems. Your studies provide a guide as to what human activities influence the natural systems and what changes must occur in order to preserve natural habitats. Fish are good indicators as to the environmental health of a stream. Studies show that humans have introduced over a dozen non-native species to Texas and that at least 20% of fish species need conservation efforts, as does the aquatic environment.

Residents of Ciudad Juarez, Mexico (Group 4)

You live in Ciudad Juarez, the largest border city along the Rio Bravo. Domestic water use remains one of the major issues for the city. Agriculture uses all of the water Ciudad Juarez receives from the Rio Bravo. The residents must draw from the Hueco Bolson aquifer, a large underground reservoir, for household use. However, humans are extracting water in the aquifer at a faster rate than it is recharging. Therefore, many residents in the city must use one of the 145 wells located in the city. The city should close some of these wells because the water is polluted due to the lack of wastewater treatment facilities. The problem is especially serious in the downtown area.

One solution to the city's water issue is to clean the water in the Rio Bravo so residents could use it. Then farmers could tap into alternative water supplies like the Mesilla Bolson and Bismarck Aquifers. The main issue

is how to restore and clean the water in the Rio Bravo. Some have suggested building a water treatment plant on the Mexican side of the border to clean the incoming water from upstream. However, such a plant is costly, and the Mexican federal government has not been able to dedicate enough money to build a plant. Your group would like to see the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADB) support this project. Building a treatment plant on the Rio Bravo would allow the residents of Ciudad Juarez to use the river as a source for drinking water. Residents would no longer have to walk to one of the wells, gather the water, and carry it back to their homes. It would also give the citizens of the city hope for the future: they would know that clean, potable water would be available for years to come.



The Stakeholders

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City Planner in Brownsville, Texas (Group 5)

As a member of the city planners in Brownsville, Texas, you want to allow for growth in the region, but you are also concerned about biodiversity. Developers have begun and want to continue to drain the resacas to provide land for housing developments. Resacas are former channels of the Rio Grande that have been cut off from the river due to land development and construction of levees and dams. Brownsville has over 3,500 acres of resaca habitat. The water used to empty into the Rio Grande during times of flooding, but with development the water remains stagnant. There is a lot of wildlife found in these wetland areas and the water today is used for drinking water, residential use, and agriculture. The condition of the resacas has been deteriorating due to the low flow. The

shallow water contains high levels of heavy metals, automotive oil, sewage, and pesticides. Recent studies of fish in the resacas have found high levels of heavy metals in the fish tissue.

Draining the resacas seems like a good idea because Brownsville needs more land for the growing population; however, the resacas still provide aquatic habitats for a variety of fish, reptiles, and birds. The pollution in the resacas is beginning to influence the wildlife and plants, and if the city continues to use the water for drinking, then the area needs to be restored. Financially, the city would benefit from having more housing, and it would be less costly than trying to preserve the ecosystems.

Maquiladora Owners (Group 6)

You are some of the many maquiladora owners in the U.S.-Mexico border region. Maquiladoras exist in many parts of Mexico, but there are more in the border region than anywhere else. Many residents view the maquiladoras in the border region as the source of the environmental problems that exist, including poor water quality and contaminants in the soil. However, every story has at least two sides.

The maquiladoras you own have brought jobs to the border region. Very few factories break any of the environmental laws set out by the U.S. and Mexican governments. The maquiladoras are obligated to return any waste produced in the factories to their country of origin for disposal. Many owners, such as you, do just this. As for those who

break the law, you believe that the Mexican government needs to do its part in enforcing the environmental laws in the region. The water quality in the Rio Grande is declining, but that is not just from maquiladoras. Population growth in the area is the real issue.

The ecosystem in the area is fragile, and the increase in population in the region is influencing the natural systems. However, the maquiladoras are increasing the economy in the area, providing more money for use in solving environmental problems. The maquiladoras employ over 1 million workers, and opportunities are abundant. As maquiladora owners, you believe that the services you provide are important. Communities and local government officials are responsible for taking care of the environment.

The Stakeholders

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Farmers in Northern Mexico (Group 7)

You are members of a group of sugar cane farmers who live in Northern Mexico. Your families have lived on the land you till for generations. Your fathers and grandfathers produced cotton using water from the Rio Bravo basin. You began your farming careers growing cotton too, but the past 20 years have seen the water quality and quantity decline. Because of this, you have had to switch from growing cotton to raising sugar cane. Even though sugar cane is a water-intensive crop, it does not require as much water as cotton. Years of drought have forced you to stop farming some of your land because you do not have enough water. Farming less land meant you grew less sugar cane and made less money for your family.

You could use water more efficiently. The type of irrigation system you use is not efficient, but you do not have the money to switch irrigation methods. Because irrigated agriculture accounts for a large

portion of water use in the region, governments are encouraging farmers to use more efficient irrigation systems. The Mexican government would like farmers to start using more efficient systems, like the drip system, but the government does not have money allocated to help the farmers do this.

Some government officials have discussed raising the price of water. Higher prices would force farmers to change irrigation systems or start planting crops that are not as water-intensive. But this idea is challenging. Sugar cane is a perennial crop that comes back every year. To change crops now, after already investing money in sugar cane, would not be economically feasible. As it is, your family can barely get by. Changing the irrigation system or crops would not be possible unless the government provides financial and technical assistance.



The Kikapu (Group 8)

The Kikapu are a North American Indian people who originated in the the Great Lakes area. Over time, the U.S. government forced them to move south. Today, they live in Kansas and Oklahoma, as well as along the Rio Grande in northern Mexico and southern Texas. As a Kikapu, you graze cattle on the land and also cultivate wheat and other crops. Much of the land was under the ejido system, meaning that the government owned the land and your group lived on the land communally. However, in 1991, Mexico eliminated the system, citing low productivity. The government sold much of the land to corporations and some farmers. Because of the poverty rate among most indigenous groups, including yours, you can not afford to buy the land you farm. You also have little access to services like telephone, mail, and health care.

Historically, in some parts of the nation, large-

scale water rights have not included American Indians. In California, however, Indian tribes have water rights. For example, the tribes have a significant influence on the management of the Klamath River. Nor do many of these groups have legal representation to help them attain rights to the water. In the 1940s, the American Smelting and Refining Company (Asarco) pumped out excessive amounts of groundwater, leaving your community unable to support yourselves. Today you must use channeled or diverted water to irrigate your crops. In the desert environment where you live, droughts and issues with water quantity and quality greatly affect your community. The by-products from power plants located in Coahuila, Mexico, and Eagle Pass, Texas, directly affect the air, water, and soil where you live. Many members of your community have complained of sickness and eye irritation from the quality of water in the Rio Grande.

4 Who Are the Stakeholders?

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Who Are the Stakeholders?



Border Environmental Cooperation Commission (BECC)



Santa Fe Environmental Group (flag of Santa Fe)



U.S. Fish and Wildlife Service (official symbol)



Residents of Ciudad Juarez, Mexico (official city seal)



City Planner in Brownsville, Texas (official city seal)



Maquiladora Owners



Farmers in Northern Mexico



The Kikapu

5 Conference Roles

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Conference Roles

Speech Writer

Responsibilities: Writing a three-four minute speech about your stakeholder group. You must include:

- background on your group (who you are, where you are located)
- how you influence or are influenced by the Rio Grande/Rio Bravo
- what factors affect your decisions about the river
- your goals involving the river

Speaker

Responsibilities: Presenting the three-four minute speech at the "Conference on Environmental Partnerships." Because you are presenting the speech, you should practice reading the speech before the conference. You may also be involved in writing the speech. You should also be familiar with the map you will show the audience during your presentation at the conference. That map is being made or found by your Cartographer.

Cartographer

Responsibilities: Creating or finding a map that shows where your group is located and how it is connected to the Rio Grande/Rio Bravo. (If your group is the Border Environmental Cooperation Commission (BECC) or U.S. Fish and Wildlife Service, you should prepare a general map of the region that shows the main cities and communities as well as where the river flows.)

6 Conference Roles

Visual Aid — Transparency

Conference Roles

Researcher/Editor

Responsibilities: Making sure the content presented in the handout and speech is accurate, the content on the map is accurate, and vocabulary is used correctly. While the other members of the group are writing and preparing maps, you should help provide content to be included in the speech, map, and any handouts your group chooses to give out.

Designer of Handout (Optional)

Responsibilities: Creating a handout to share with the other conference members. The handout should include some background on your group, how you are connected to the Rio Grande/Rio Bravo, your goals, and how you suggest attaining those goals.

7 Agenda for the Conference

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Agenda for the Conference

Welcome to the first annual **Conference on Environmental Partnerships between the United States and Mexico**. We have come together today to learn about the people and organizations that care about and are influenced by the Rio Grande/Rio Bravo. As the population continues to increase in the border region, concern grows regarding the quality of water and having enough water available for people and businesses on both sides of the border.

We will begin by having each stakeholder group present their perspective. Each group has five minutes to present. The groups will present in the following order:

1. Border Environmental Cooperation Commission (BECC)
2. Santa Fe Environmental Group
3. U.S. Fish and Wildlife Service
4. Residents of Ciudad Juarez, Mexico
5. City Planner in Brownsville, Texas
6. Maquiladora Owners
7. Farmers in Northern Mexico
8. The Kikapu

During the presentations, take notes, using the Conference Notes form (Lesson 4 Activity Master), on how the other groups are connected to the Rio Grande. Once all groups have presented, we will discuss some questions as a group.